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COLLIDER-ACCELERATOR DEPARTMENT

Title: Lockout Procedure for the Blue IR Dipole Nested Power Supplies or QPA/s During Running Periods when a Power Supply Must be Replaced

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Date: _____

☐ ☐ Chief ME: _____

Date: _____

☒ ☐ Chief EE: Jim Sandberg

Date: 10/3/03

☐ ☐ Environmental/P2 Coordinator: _____

Date: _____

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Date: _____

☐ ☐ Other: _____

Date: _____

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Lockout Procedure For the Blue IR Dipole Nested Power Supplies or QPA's During Running Periods When a Power Supply Must be Repaired

1. Purpose

- 1.1 This procedure provides instructions to the Collider Electrical Power Supply Group (CEPSG) technicians and the Collider-Accelerator Support (CAS) technicians on the proper lockout that must be done before you repair a nested Blue IR dipole power supply (p.s.) or QPA.

Caution:

This lockout procedure can only be used in preparation to repair a Nested Blue IR Dipole P.S. or QPA during running periods. See Appendix 1 for a complete list of the sitewide names of these Nested Blue IR Dipole P.S's and QPA's. If the sitewide name of the Blue p.s. or QPA that must be repaired is on the list in Appendix 1 then you can use this procedure.

- 1.2 C-A Policy states that the preferred method to protect workers from energy sources is Lockout-Tagout (LOTO). There is no need to place a tag on the lock if the lock will not stay on past 1 shift or overnight as is consistent with standard LOTO Procedures.
- 1.3 Running Periods are defined as those periods when the C-A Main Control Room (MCR) has a scheduled operator on watch 24 hours a day and beam is being delivered or beam is being prepared to be delivered to RHIC.

2. Responsibilities

2.1 Responsibilities of the CEPSG and CAS Technicians

- 2.1.1 Any CEPSG and CAS Technicians preparing to repair a Nested Blue IR Dipole P.S. or QPA shall apply their lock, as described in section 5, to assure their own safety.

2.2 Responsibilities of System Specialists

- 2.2.1 System Specialists are responsible for training the CEPSG and CAS Technicians.

3. **Prerequisites for the CEPST and CAS Technicians**

- 3.1 The CEPST and CAS Technicians must be trained in LOTO.
- 3.2 The CEPST and CAS Technicians must be trained in the use of this procedure and their name must appear on a list maintained by Don Bruno and Bill Anderson. This list is attached in Appendix 4 and will be updated as more people are trained. The training is valid for 1 year.
- 3.3 The CEPST and CAS Technicians must be trained in Electrical Safety.
- 3.4 The CEPST and CAS Technicians must wear safety glasses when using this procedure.

4. **Precautions for the CEPST and CAS Technicians**

- 4.1 If the repair of the Nested Blue IR Dipole p.s. is in the DC compartment or if you must work on the isolation amplifier board then this procedure must be used. If the repair is in the upper front AC compartment then you can just lockout the 480VAC to the p.s. If the repair is in the lower front control compartment then you can just lockout the 480VAC to the p.s. if you stay at least 6 inches away from the isolation amplifier board. See Figure 1 in Appendix 2 for a photo of the location of the isolation amplifier board.

5. **Procedure**

- 5.1 If you must repair a Nested Blue IR Dipole P.S. or QPA then write down the name of this p.s. here: _____
- 5.2 Next consult the Appendix 1 and make sure the name is in the appendix. You have now confirmed that this p.s. or QPA is a Nested Blue IR Dipole P.S. or QPA

Warning:

If this p.s. does not appear in Appendix 1 then STOP and consult the engineer.

- 5.3 Make sure the Blue link is down before performing this lockout. MCR can tell you if the link is down. If MCR says the link is not down then tell them you will bring the link down.

- 5.4 Get a lock and go out and look at the p.s. or QPA that must be repaired. See Appendix 1 to find out which building the p.s. or QPA is in. At the top of the p.s. is a “rack” name even though the p.s. is not in a rack. Write down the building and rack name here:
Building _____
Rack Name _____
- 5.5 If the Blue link is not down then tell MCR you will be bringing the link down but they must run all of the p.s.’s to zero current first.
- 5.6 Once the p.s.’s are at zero current you should put the p.s. that must be repaired into LOCAL and STANDBY from the front panel controls. Now put it in the OFF state. Use the OFF pushbutton on the front of the p.s. to do this. The Blue link will now come down if it is not down already. If a QPA is being repaired do the same thing to its associated p.s.
- 5.7 Now that the p.s. is in the OFF state you can turn OFF the circuit breaker on the front of this p.s.
- 5.8 Lockout the 480VAC disconnect that feeds this p.s.. Check off that it has been locked out here:
_____ (Locked out 480VAC Disconnect)
- 5.9 Go to service building 1004B and lockout the following Blue main dipole power supplies:
PBDR _____ (CHECK AFTER LOCKED OUT)
PBDFT _____ (CHECK AFTER LOCKED OUT)
- 5.10 You lock these main p.s.’s out by turning the red front panel switch to the left and then squeeze in the Yellow part of the handle on the switch in. You can now CAREFULLY PUT A LOCK THROUGH THIS HOLE. See Appendix 2 Figure 2 for a photo of the switch.
- 5.11 Go to service building 1010A and lockout the following Blue Quench Switches See Appendix 3 for photos:
R10ADS3 (near valve boxes) _____ (CHECK AFTER LOCKED OUT)
R10ADS2 (near valve boxes) _____ (CHECK AFTER LOCKED OUT)
- 5.12 Go to the rack labeled R10ADS3 first. This is located near the valve boxes. This is also known as the blue sector 9 dipole quench protection switch. Find the UPS made by APC in this rack. It also says “Smart UPS 3000” on it. Press the button with the “o” on it to turn it OFF. See Appendix 3 Figure 1.
- 5.13 Right above this UPS is a panel with a black switch. Turn it to the OFF position. It is very stiff (careful not to break it) but if you turn it hard enough it will turn. See Appendix 3 Figure 2.

- 5.14 Right below the UPS is a panel labeled “High Voltage Power Supply” with a black knob on it. See Appendix 3 Figure 1. All the way to the left there is a fuse labeled “F1” that can be removed. Remove this fuse. DO NOT LOSE this fuse. Cover the hole of the empty fuse holder with a red self stick red tag as shown in Appendix 3 Figure 1. This quench switch in rack R10ADS3 is now locked out. Repeat this procedure for rack R10ADS2 to lock out the quench switch in that rack.
- 5.15 After you have completed repairing the p.s. or QPA you can now unlock the 480VAC disconnect for the p.s. you were working on and turn ON the circuit breaker on the p.s.
- 5.16 Now you can unlock the quench switches in 1010A. First replace the fuse that you removed from High Voltage power supply for R10ADS3. Second turn on the black switch on the panel on top of the UPS. Third press the button on the UPS that says “test” on it. The UPS should now turn back on. Repeat this procedure for rack R10ADS2.
- 5.17 Next, you can now unlock the main p.s.’s and then restore the regulator to operational conditions. Restore the main p.s. regulator by following this procedure:
<http://www.c-ad.bnl.gov/ceps/files/pdf/Unlock%20and%20Restore%20MPS.pdf>
- 5.18 If there is a problem getting the above link to work in 5.17 then the procedure in 5.17 is called “Unlocking and Restoring Main Power Supplies”. It can be found by going to this web page:
<http://www.c-ad.bnl.gov/ceps/Mains.htm>
- 5.19 Once you are done restoring the regulator for the main p.s.’s, tell MCR that they can now bring up the Blue link up.

Appendix 1
NESTED RHIC BLUE IR Dipole Power Supplies

BUILDING 1002B	
P.S. Name	Rack Number
B2-DHX-PS	R2BD2
B2-DH0-PS	R2BD3
BUILDING 1004B	
P.S. Name	Rack Number
B4-DHX-PS	R4BD2
B4-DH0-PS	R4BD3
BUILDING 1006B	
P.S. Name	Rack Number
B6-DHX-PS	R6BD2
B6-DH0-PS	R6BD3
BUILDING 1008B	
P.S. Name	Rack Number
B8-DHX-PS	R8BD2
B8-DH0-PS	R8BD3
BUILDING 1010A	
P.S. Name	Rack Number
BI9-DH0-PS	R10AD4
BI9-DHX-PS	R10AD3
BO10-DHX-PS	R10AD7
BO10-DH0-PS	R10AD8
BUILDING 1012A	
P.S. Name	Rack Number
B12-DH0-PS	R12AD3
B12-DHX-PS	R12AD2

Appendix 1 (continued)
NESTED RHIC BLUE IR Dipole QPA's

BUILDING 1002B	
P.S. Name	Rack Number
B2-DHX-QP	R2BD2
B2-DH0-QP	R2BD3
BUILDING 1004B	
P.S. Name	Rack Number
B4-DHX-QP	R4BD2
B4-DH0-QP	R4BD3
BUILDING 1006B	
P.S. Name	Rack Number
B6-DHX-QP	R6BD2
B6-DH0-QP	R6BD3
BUILDING 1008B	
P.S. Name	Rack Number
B8-DHX-QP	R8BD2
B8-DH0-QP	R8BD3
BUILDING 1010A	
P.S. Name	Rack Number
BI9-DH0-QP	R10AD4
BI9-DHX-QP	R10AD3
BO10-DHX-QP	R10AD7
BO10-DH0-QP	R10AD8
BUILDING 1012A	
P.S. Name	Rack Number
B12-DH0-QP	R12AD3
B12-DHX-QP	R12AD2

Appendix 2

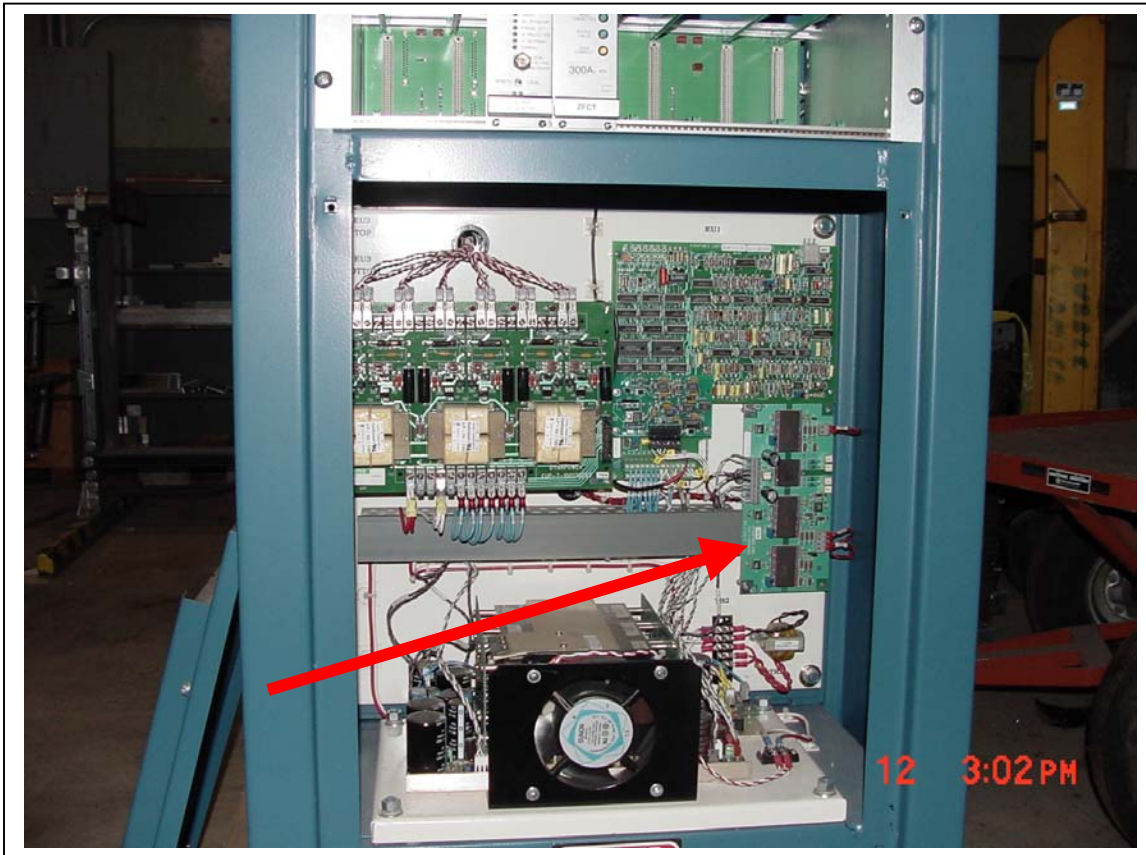


Figure 1: Photo of Isolation Amplifier board in lower front Control Compartment of Stand Alone p.s.

The RED arrow is pointing at the isolation amplifier board.

Appendix 2 (continued)
Photo of one RED Front Panel Switch for the PBDFT Main p.s.

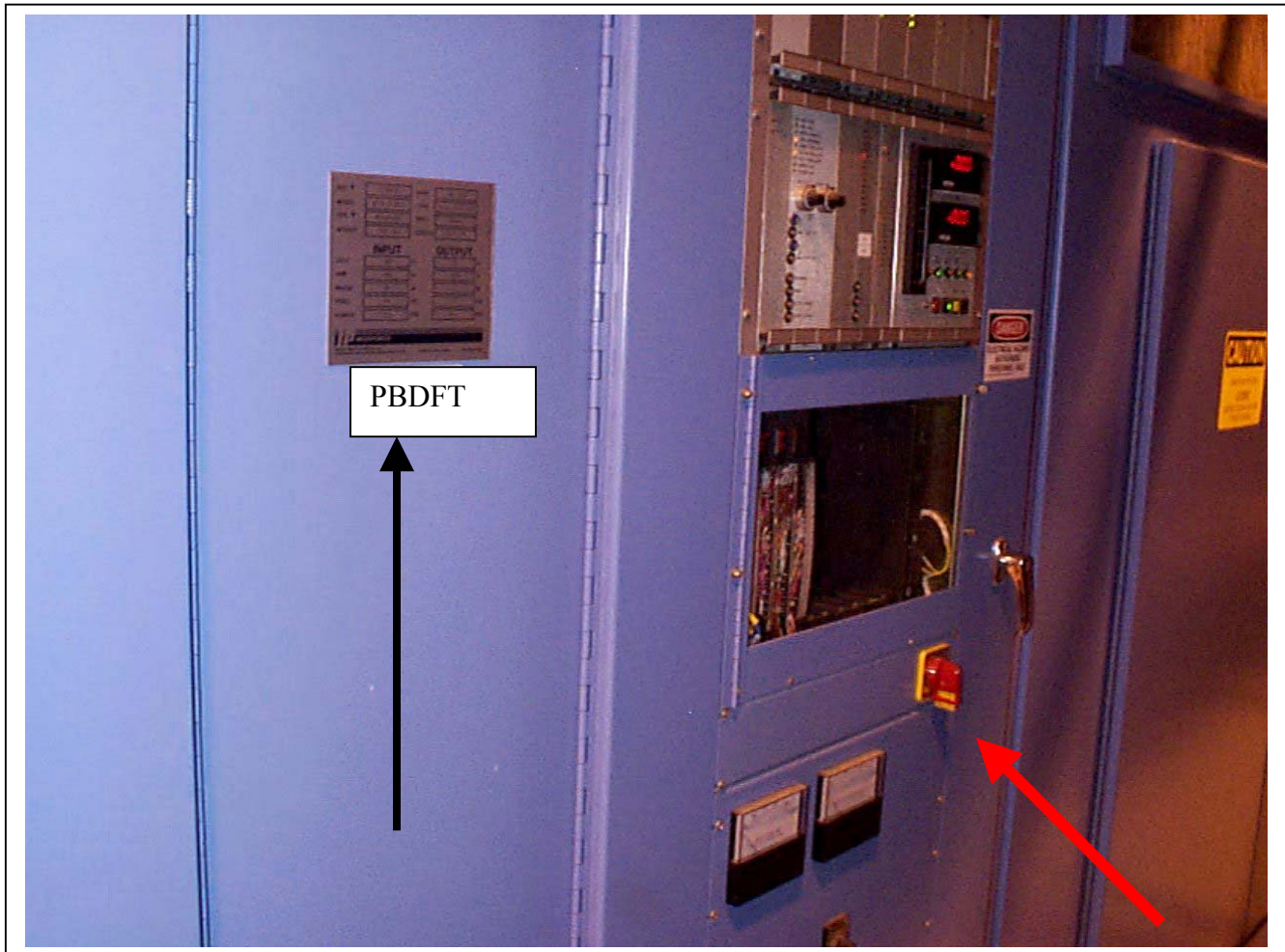


Figure 2: Photo of one RED Front Panel Switch for the PBDFT Main p.s.

The Red Arrow is pointing to the RED switch you must lockout for the main p.s. PBDFT

The Black Arrow is pointing to the label that tells you which p.s. this is.

Appendix 3 (see next page for more)
Photos of one part of 6000Amp Quench Switch that is part of Lockout



Figure 1 : UPS (see it says APC on it), High Voltage p.s. under it. There is a red tag over the fuse holder in this photo.



Figure 2: Panel on top of UPS with black switch.

Appendix 3 (continued)

Photos of one part of 6000Amp Quench Switch that is part of Lockout



Figure 3: Photo of all four 6000Amp Quench Switches in 1010A



Figure 4: Photo of top of one Quench Switch showing name of rack

Appendix 4

Lockout Procedure For the Blue IR Dipole Nested Power Supplies During Running Periods When a Power Supply Must be Repaired

List of People Trained. Training is valid for 1 year

Name	Date Trained